IN THE CLAIMS:

Kindly amend the claims, as follows:

1. (Currently Amended) A method to perform low-density parity-check code encoding of user data u of length N_u, by inserting parity data p of length N_p into output data c of length N in accordance with a parity matrix H such that $\mathbf{H \cdot c} = 0$, comprising the steps of:

(a) receiving the user data of block length N_u;

(b) decomposing $\mathbf{H \cdot c}$ into a first component $\mathbf{H_u \cdot u}$ corresponding to the user data and a second component $\mathbf{H_p \cdot p}$ corresponding to the parity data such that $\mathbf{H_u \cdot u} + \mathbf{H_p \cdot p} = 0$;

(c) calculating a vector $\underline{u} = \mathbf{H_u \cdot u}$; and

(d) calculating $p = ~~\mathbf{H_u^{-1}} \cdot \underline{u}~~ \underline{\mathbf{H_p^{-1}} \cdot u}$.

2. (Original) The method of Claim 1, wherein $\mathbf{H_u}$ comprises a N_p x N_u matrix and $\mathbf{H_p}$ comprises a N_p x N_p matrix.

3. (Original) The method of Claim 1, further comprising the step of:

(e) receiving address information,

wherein step (c) is performed in accordance with step (e).

4. (Original) The method of Claim 1, wherein step (c) comprises the step of:

(f) updating elements of u as follows:

$u(i) = u(i) \oplus$ bit.

5. (Currently Amended) The method of Claim 1, wherein step (d) comprises the step of:

(g) reducing a row weight of $[[\mathbf{H_u^{-1}}]]$ $\underline{\mathbf{H_p^{-1}}}$ by representing $[[\mathbf{H_u^{-1}}]]$ $\underline{\mathbf{H_p^{-1}}}$ as M1 * M2.

6. (Currently Amended) The method of Claim 1, wherein step (d) comprises the step of:

(g) reducing a row weight of $[[\mathbf{H}_u^{-1}]]\ \underline{\mathbf{H}_p^{-1}}$ by representing $[[\mathbf{H}_u^{-1}]]\ \underline{\mathbf{H}_p^{-1}}$ as $\prod_{i=1}^{s} M_i$.

7. (Original) The method of Claim 1, wherein step (c) is performed prior to step (d).

8. (Currently Amended) A low-density parity-check code encoder to encode user data u of length N_u, by inserting parity data p of length N_p into output data c of length N in accordance with a parity matrix H such that $\mathbf{H}\cdot\mathbf{c}=0$, comprising:

an input to input the user data of block length N_u;

an H c decomposer to decompose $\mathbf{H}\cdot\mathbf{c}$ into a first component $\mathbf{H}_u\cdot\mathbf{u}$ corresponding to the user data and a second component $\mathbf{H}_p\cdot\mathbf{p}$ corresponding to the parity data such that $\mathbf{H}_u\cdot\mathbf{u} + \mathbf{H}_p\cdot\mathbf{p} = 0$;

a $\underline{u}$ calculator to calculate a vector $\underline{u} = \mathbf{H}_u\cdot\mathbf{u}$; and

a $p = \underline{P}\ \underline{u}$ calculator to calculate $p= \mathbf{H}_u^{-1}\cdot\underline{u}\ \underline{\mathbf{H}_p^{-1}\cdot u}$.

9. (Original) The encoder of Claim 8, wherein $\mathbf{H}_u$ comprises a N_p x N_u matrix and $\mathbf{H}_p$ comprises a N_p x N_p matrix.

10. (Original) The encoder of Claim 8, further comprising:

a second input to input address information,

wherein said $\underline{u}$ calculator calculates the vector $\underline{u} = \mathbf{H}_u\cdot\mathbf{u}$ in accordance with said second input.

11. (Original) The encoder of Claim 8, wherein said $\underline{u}$ calculator updates elements of $\underline{u}$ as follows:

$u(i) = u(i) \oplus$ bit.

12. (Currently Amended) The encoder of Claim 8, wherein said p = P u calculator reduces a row weight of $[[\mathbf{H}_u^{-1}]]$ $\mathbf{H}_p^{-1}$ by representing $[[\mathbf{H}_u^{-1}]]$ $\mathbf{H}_p^{-1}$ as M1 * M2.

13. (Currently Amended) The encoder of Claim 8, wherein said p = P u calculator reduces a row weight of $[[\mathbf{H}_u^{-1}]]$ $\mathbf{H}_p^{-1}$ representing $[[\mathbf{H}_u^{-1}]]$ $\mathbf{H}_p^{-1}$ as $\prod_{i=1}^{s} M_i$.

14. (Currently Amended) The encoder of Claim 8, wherein said u calculator calculates the vector u = $\mathbf{H}_u \cdot \mathbf{u}$ prior to said p = P u calculator calculating p= ~~$\mathbf{H}_u^{-1} \cdot$~~ u $\mathbf{H}_p^{-1} \cdot$ u.

15. (Currently Amended) A computer program to perform low-density parity-check code encoding of user data u of length N_u, by inserting parity data p of length N_p into output data c of length N in accordance with a parity matrix H such that $\mathbf{H} \cdot \mathbf{c} = 0$, comprising the steps of:

(a) receiving the user data of block length N_u;

(b) decomposing $\mathbf{H} \cdot \mathbf{c}$ into a first component $\mathbf{H}_u \cdot \mathbf{u}$ corresponding to the user data and a second component $\mathbf{H}_p \cdot \mathbf{p}$ corresponding to the parity data such that $\mathbf{H}_u \cdot \mathbf{u} + \mathbf{H}_p \cdot \mathbf{p} = 0$;

(c) calculating a vector u = $\mathbf{H}_u \cdot \mathbf{u}$; and

(d) calculating p = ~~$\mathbf{H}_u^{-1} \cdot$~~ u $\mathbf{H}_p^{-1} \cdot$ u.

16. (Original) The computer program of Claim 15, wherein $\mathbf{H}_u$ comprises a N_p x N_u matrix and $\mathbf{H}_p$ comprises a N_p x N_p matrix.

17. (Original) The computer program of Claim 15, further comprising the step of:

(e) receiving address information,

wherein step (c) is performed in accordance with step (e).

18. (Original) The computer program of Claim 15, wherein step (c) comprises the

step of:

(g) updating elements of $\underline{u}$ as follows:

$u(i) = u(i) \oplus bit$.

19. (Currently Amended) The computer program of Claim 15, wherein step (d) comprises the step of:

(g) reducing a row weight of $[[\mathbf{H}_u^{-1}]]\ \underline{\mathbf{H}_p^{-1}}$ by representing $[[\mathbf{H}_u^{-1}]]\ \underline{\mathbf{H}_p^{-1}}$ as M1 * M2.

20. (Currently Amended) The computer program of Claim 15, wherein step (d) comprises the step of:

(g) reducing a row weight of $[[\mathbf{H}_u^{-1}]]\ \underline{\mathbf{H}_p^{-1}}$ by representing $[[\mathbf{H}_u^{-1}]]\ \underline{\mathbf{H}_p^{-1}}$ as $\prod_{i=1}^{5} M_i$.

21. (Original) The computer program of Claim 15, wherein step (c) is performed prior to step (d).

22. (Currently Amended) A data transmission system for transmitting user data to and receiving data from a communication channel, comprising:

a low-density parity-check code encoder to encode user data u of length N_u, by inserting parity data p of length N_p into output data c of length N in accordance with a parity matrix H such that $\mathbf{H} \cdot \mathbf{c} = 0$, comprising:

an input to input the user data of block length N_u;

an H c decomposer to decompose $\mathbf{H} \cdot \mathbf{c}$ into a first component $\mathbf{H}_u \cdot \mathbf{u}$ corresponding to the user data and a second component $\mathbf{H}_p \cdot \mathbf{p}$ corresponding to the parity data such that $\mathbf{H}_u \cdot \mathbf{u} + \mathbf{H}_p \cdot \mathbf{p} = 0$;

a $\underline{u}$ calculator to calculate a vector $\underline{u} = \mathbf{H}_u \cdot \mathbf{u}$; and

a $p = \underline{P}\ \underline{u}$ calculator to calculate $p = \mathbf{H}_u^{-1} \cdot \underline{u}\ \underline{\mathbf{H}_p^{-1} \cdot u}$;

a transmitter to transmit an output of said low-density parity-check code encoder to

the communication channel;

a soft channel decoder to decode data from the communication channel; and

a soft low-density parity-check code decoder to decode data decoded by said soft channel decoder.

23. (Original) The system of Claim 22, wherein $\mathbf{H_u}$ comprises a N_p x N_u matrix and $\mathbf{H_p}$ comprises a N_p x N_p matrix.

24. (Original) The system of Claim 22, further comprising:

an address generator to generate address information in accordance with the user data;

second input means for inputting address information,

a second input to input address information,

wherein said u calculator calculates the vector $\underline{u} = \mathbf{H_u} \cdot \mathbf{u}$ in accordance with said second input.

25. (Original) The system of Claim 22, wherein said u calculator updates elements of u as follows:

$u(i) = u(i) \oplus$ bit.

26. (Currently Amended) The system of Claim 22, wherein said $p = \underline{P}\ \underline{u}$ calculator reduces a row weight of $[[\mathbf{H_u}^{-1}]]\ \underline{\mathbf{H_p}^{-1}}$ by representing $[[\mathbf{H_u}^{-1}]]\ \underline{\mathbf{H_p}^{-1}}$ as M1 * M2.

27. (Currently Amended) The system of Claim 22, wherein said $p = \underline{P}\ \underline{u}$ calculator reduces a row weight of $[[\mathbf{H_u}^{-1}]]\ \underline{\mathbf{H_p}^{-1}}$ representing $[[\mathbf{H_u}^{-1}]]\ \underline{\mathbf{H_p}^{-1}}$ as $\prod_{i=1}^{s} M_i$.

28. (Currently Amended) The system of Claim 22, wherein said u calculator calculates the vector $\underline{u} = \mathbf{H_u} \cdot \mathbf{u}$ prior to said $p = \underline{P}\ \underline{u}$ calculator calculating $p = \underline{\mathbf{H_p}^{-1} \cdot u}$.

29. (Currently Amended) A low-density parity-check code encoder to encode user data u of length N_u, by inserting parity data p of length N_p into output data c of length N in accordance with a parity matrix H such that $\mathbf{H \cdot c} = 0$, comprising:

input means for inputting the user data of block length N_u;

H c decomposer means for decomposing $\mathbf{H \cdot c}$ into a first component $\mathbf{H_u \cdot u}$ corresponding to the user data and a second component $\mathbf{H_p \cdot p}$ corresponding to the parity data such that $\mathbf{H_u \cdot u} + \mathbf{H_p \cdot p} = 0$;

$\underline{u}$ calculating means for calculating a vector $\underline{u} = \mathbf{H_u \cdot u}$; and

$p = \underline{P}\ \underline{u}$ calculating means for calculating $p = \mathbf{H_u^{-1}} \cdot \underline{u}$ $\underline{\mathbf{H_p^{-1}} \cdot u}$.

30. (Original) The encoder of Claim 29, wherein $\mathbf{H_u}$ comprises a N_p x N_u matrix and $\mathbf{H_p}$ comprises a N_p x N_p matrix.

31. (Original) The encoder of Claim 29, further comprising:

second input means for inputting address information,

wherein said $\underline{u}$ calculating means calculates the vector $\underline{u} = \mathbf{H_u \cdot u}$ in accordance with said second input means.

32. (Original) The encoder of Claim 29, wherein said $\underline{u}$ calculating means updates elements of $\underline{u}$ as follows:

$u(i) = u(i) \oplus$ bit.

33. (Currently Amended) The encoder of Claim 29, wherein said $p = \underline{P}\ \underline{u}$ calculating means reduces a row weight of $[[\mathbf{H_u^{-1}}]]$ $\underline{\mathbf{H_p^{-1}}}$ by representing $[[\mathbf{H_u^{-1}}]]$ $\underline{\mathbf{H_p^{-1}}}$ as M1 * M2.

34. (Currently Amended) The encoder of Claim 29, wherein said $p = \underline{P}\ \underline{u}$ calculating means reduces a row weight of $[[\mathbf{H_u^{-1}}]]$ $\underline{\mathbf{H_p^{-1}}}$ representing $[[\mathbf{H_u^{-1}}]]$ $\underline{\mathbf{H_p^{-1}}}$ as $\prod_{i=1}^{s} M_i$.

35. (Currently Amended) The encoder of Claim 29, wherein said $\underline{u}$ calculating means calculates the vector $\underline{u} = \mathbf{H_u \cdot u}$ prior to said $p = \underline{P}\ \underline{u}$ calculating means calculating $p = \mathbf{H_u^{-1}} \cdot \underline{u}$ $\mathbf{H_p^{-1}} \cdot \underline{u}$.

36. (Currently Amended) A data transmission system for transmitting user data to and receiving data from a communication channel, comprising:

low-density parity-check code encoding means to encode user data u of length N_u, by inserting parity data p of length N_p into output data c of length N in accordance with a parity matrix H such that $\mathbf{H \cdot c} = 0$, comprising:

input means for inputting the user data of block length N_u;

H c decomposer means for decomposing $\mathbf{H \cdot c}$ into a first component $\mathbf{H_u \cdot u}$ corresponding to the user data and a second component $\mathbf{H_p \cdot p}$ corresponding to the parity data such that $\mathbf{H_u \cdot u} + \mathbf{H_p \cdot p} = 0$;

$\underline{u}$ calculating means for calculating a vector $\underline{u} = \mathbf{H_u \cdot u}$; and

$p = \underline{P}\ \underline{u}$ calculating means for calculating $p = \mathbf{H_u^{-1}} \cdot \underline{u}$ $\mathbf{H_p^{-1}} \cdot \underline{u}$;

transmitting means for transmitting an output of said low-density parity-check code encoding means to the communication channel;

soft channel decoding means for decoding data from the communication channel; and

soft low-density parity-check code decoding means for decoding data decoded by said soft channel decoding means.

37. (Previously Presented) The system of Claim 36, wherein $\mathbf{H_u}$ comprises a N_p x N_u matrix and $\mathbf{H_p}$ comprises a N_p x N_p matrix.

38. (Previously Presented) The system of Claim 36, further comprising:

address generator means for generating address information in accordance with the user data;

second input means for inputting the address information,

wherein said $\underline{u}$ calculating means calculates the vector $\underline{u} = \mathbf{H_u} \cdot \mathbf{u}$ in accordance with said second input means.

39. (Previously Presented) The system of Claim 36, wherein said $\underline{u}$ calculating means updates elements of $\underline{u}$ as follows:

$u(i) = u(i) \oplus bit.$

40. (Currently Amended) The system of Claim 36, wherein said $p = \underline{P}\ \underline{u}$ calculating means reduces a row weight of $[[\mathbf{H_u}^{-1}]]$ $\underline{\mathbf{H_p}^{-1}}$ by representing $[[\mathbf{H_u}^{-1}]]$ $\underline{\mathbf{H_p}^{-1}}$ as M1 * M2.

41. (Currently Amended) The system of Claim 36, wherein said $p = \underline{P}\ \underline{u}$ calculating means reduces a row weight of $[[\mathbf{H_u}^{-1}]]$ $\underline{\mathbf{H_p}^{-1}}$ representing $[[\mathbf{H_u}^{-1}]]$ $\underline{\mathbf{H_p}^{-1}}$ as $\prod_{i=1}^{s} M_i$.

42. (Currently Amended) The system of Claim 36, wherein said $\underline{u}$ calculating means calculates the vector $\underline{u} = \mathbf{H_u} \cdot \mathbf{u}$ prior to said $p = \underline{P}\ \underline{u}$ calculating means calculating $p = \mathbf{H_u}^{-1} \cdot \underline{u}$ $\underline{\mathbf{H_p}^{-1} \cdot u}$.